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Docket No.: E-41409

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By: ______________________ Date: July 3, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

Applicant	:	Ludwig Wieres
Applic. No.	:	09/992,285
Filed	:	November 19, 2001
Title	:	Honeycomb Body, in Particular Catalyst Carrier Body, for Motorcycle or Diesel Applications
Examiner	:	Jonas N. Strickland - Art Unit: 1754

BRIEF ON APPEAL

Hon. Commissioner for Patents,
P.O. Box 1450
Alexandria, VA 22313-1450

S i r :

This is an appeal from the final rejection in the Office action dated February 20, 2003, finally rejecting claims 1, 4, 6, 8-10, 12, 13, 15, 16, 18 and 19.

Appellants submit this *Brief on Appeal* in triplicate, including payment in the amount of $320.00 to cover the fee for filing the *Brief on Appeal*.

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Real Party in Interest:

This application is assigned to Emitec Gesellschaft für Emissionstechnologie mbH of Lohmar, Germany. The assignment will be submitted for recordation upon the termination of this appeal.

Related Appeals and Interferences:

No related appeals or interference proceedings are currently pending which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of Claims:

Claims 1, 4, 6, 8-10, 12, 13, 15, 16, 18 and 19 are rejected. Claims 2-3, 5, 7-9, 11, 12, 14, 15, 17, 18 and 20 were cancelled in an amendment submitted on May 20, 2003. Therefore, claims 1, 4, 6, 10, 13, 16 and 19 are under appeal.

Status of Amendments:

No claims were amended after the final Office action. *An amendment under 37 CFR § 1.116* was submitted on May 20, 2003 together with a *Notice of Appeal*.

Summary of the Invention:

As stated in the first paragraph on page 1 of the specification of the instant application, the invention relates to a honeycomb body which is produced from layered or

wound sheet-metal layers, as is used in particular as a catalyst carrier body for exhaust gas-cleaning systems. Such honeycomb bodies are typically produced from alternating layers of smooth and corrugated sheets or from alternating layers of differently structured metal sheets, by winding or layering. Honeycomb bodies of that type are described, for example, in International Publication No. WO 94/13939, corresponding to U.S. Patent Nos. 5,729,902 and 5,618,501.

Appellant explained on page 9 of the specification, line 25, that, referring now in detail to the single figure of the drawing, there is seen a honeycomb body 1, which is produced from smooth sheet-metal layers 2 and corrugated sheet-metal layers 3 and is situated inside a tubular jacket 5. The sheet-metal layers 2, 3 are formed of metal sheets having a thickness d of from 0.08 to 0.12 mm. The sheet-metal layers 2, 3 form passages 4 through which exhaust gas can flow and which are preferably of such a size that the honeycomb body has between 200 and 600 cpsi. The sheet-metal layers are formed of a stainless steel containing 15 to 25 percent by weight of chromium, preferably 18 to 22%, typical levels of certain rare earths which are known to increase the resistance to corrosion and an aluminum content of 1 to 4.5%, in particular 2 to 4%.

Appellant further explained on page 10 of the specification, line 13, that the present invention allows particularly inexpensive production of catalyst carrier bodies for exhaust-cleaning systems of motorcycles or diesel vehicles, the quality of which is adapted to the surrounding conditions.

<u>References Cited</u>:

U.S. Patent No. 4,414,023 (Aggen et al.), dated November 8, 1983;

U.S. Patent No. 5,422,083 (Sheller), dated June 6, 1995;

Published European Patent Application No. 0 497 992 A1 (Sato et al.), dated August 12, 1992.

<u>Issues</u>

1. Whether or not claims 1, 4, 6, 10, 13, and 19 are obvious over Sheller in view of Aggen et al. under 35 U.S.C. §103(a)(noting that claims 8-9, 12, and 15 have been cancelled).
2. Whether or not claim 16 is obvious over Sheller in view of Aggen et al. and further in view of Sato et al. under 35 U.S.C. §103(a) (noting that claim 18 has been cancelled).

<u>Grouping of Claims</u>:

Claims 1 and 19 are independent. Claims 4, 6, 10, 13, and 16 depend on claim 1. The patentability of claims 1 and 19 are

separately argued. Therefore, claims 4, 6, 10, 13, and 16 stand or fall with claim 1.

Arguments:

In item 3 on pages 2-4 of the above-mentioned Office action, claims 1, 4, 6, 8-10, 12-13, 15 and 19 have been rejected as being unpatentable over Sheller (US Pat. No. 5,422,083) in view of Aggen et al. (US Pat. No. 4,414,023) under 35 U.S.C. § 103(a).

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claims 1 and 19 call for, inter alia:

> layered or wound sheet-metal layers at least partially structured to form passages through which exhaust gas can flow, said sheet-metal layers formed of a stainless steel, having a thickness of more than 0.08 mm and <u>having an aluminum content in percent by weight of between 6 and 12% multiplied by 0.02 mm divided by said thickness of said sheet-metal layers</u>. (Emphasis added).

According to claims 1 and 19 of the instant application, the aluminum content of the sheet metal layers used to form the honeycomb body is between 6 to 12 percent multiplied by 0.02 millimeters divided by the thickness of the sheet metal layers. This teaches one skilled in the art precisely how large the aluminum content of the sheet metal layer has to be. The aluminum content is dependent on the thickness of the

layers being used. This is advantageous for thick sheet metal layers of more than 0.08 millimeters thickness. The advantage of such a honeycomb body is that the sheet metal layers used for the production of a honeycomb body can be produced precisely and at particularly low costs (see page 3, line 25 to page 4, line 4 of the specification of the instant application).

Sheller discloses a reinforced catalytic converter made of two types of thin metal strips: corrugated thin metal strips and flat thin metal strips (see column 4, lines 36-51). The basic idea of Sheller is to reinforce the catalytic converter by forming a part of the flat metal sheets from an alloy having improved strength properties as compared to the alloy from which the remaining layers are formed, whereas all layers have preferably the same thickness (see column 4, lines 62-65).

Sheller discloses a thickness of the sheet metal layers in the range 0.001 to 0.009 inches (see column 4, lines 36 to 48). Sheller also discloses that the flat metal layers may be made of Haynes 214 or Haynes 230 alloy (see column 4, lines 39-41). Haynes 230 alloy is a nickel-based alloy that contains no aluminum (see column 2, lines 2-6). A nickel based Haynes 214 alloy is described in a specific example in column 2, lines 63 to 67 of Sheller as containing 75 % nickel, 16 % chromium, 4.5 % aluminum, 3 % iron, optionally trace amounts of one or more

rare earth metals, except yttrium, 0.05 carbon, and trace amounts of steel making impurities.

In summary, Sheller teaches to manufacture a honeycomb body wherein:

- the corrugated metal layers are made of ferritic stainless steel like, e.g., Alpha IV,
- the flat metal layers are composed of a nickel based alloy having an aluminum content of 4.5 %, and
- all layers have a thickness in the range of 0.001 inch (0.00254 cm) to 0.009 inches (0.02286 cm).

This means that for all thicknesses of thin metal strips disclosed by Sheller the composition is the same. Therefore, Sheller does not teach the change of aluminum content depending on the thickness of the sheet metal layer, as recited in claims 1 and 19 of the instant application.

Aggen et al. disclose a ferritic stainless steel alloy which contains 3 to 8 % aluminum (see column 3, lines 14-30). Aggen et al. further disclose that the aluminum content is variable depending on the chromium content. Aggen et al. discloses the following formula:

$$\%AL = (40 - \%Cr) / 6.$$

This means that one skilled in the art is taught by Aggen et al. that it is advantageous to specify the aluminum content in dependence on the chromium content. Aggen et al. disclose foils of 0.002 inch (0.005 cm) thickness (see column 8, lines 39 to 41). However, Aggen et al. do not disclose foils of varying thickness. The only foil thickness disclosed by Aggen et al. is the foil thickness of 0.002 inch (0.005 cm) as disclosed in column 8, lines 39 to 41.

Therefore, Aggen et al. do not disclose any dependence of the aluminum content on the thickness of the foil as recited in claims 1 and 19 of the instant application.

Furthermore, neither Sheller nor Aggen et al. contain any suggestion or hint to use a composition of alloy which is dependent on the thickness of the sheet metal layer. Therefore, there is no incentive for one skilled in the art to combine Sheller with Aggen et al. to reach the teaching of claims 1 and 19 of the instant application.

As discussed above, Sheller discloses a converter body for use as a catalyst carrier body of internal combustion engines (see column 1, lines 1 to 22). The converter body is manufactured by rolling together flat and corrugated metal sheets (see, e.g., Fig. 2). The object of Sheller is to provide a honeycomb body which is able to survive the hot shake test and

the hot cycling test (see column 3, lines 17 to 21). This object is achieved by manufacturing the honeycomb body not from flat and corrugated sheet metal layers made of one alloy, but by producing at least a part of the flat sheet metal layers from an alloy other than that of the rest of the sheet metal layers (see column 4, lines 36 to 51). Two different regions of thicknesses of die metal strips are disclosed. On the one hand, it is disclosed in column 4, lines 44 to 48 that the metal strips having a higher strength than the other metal strips have a thickness in the range of 0.001 inch to about 0.009 inch. On the other hand, it is disclosed that the thickness of the other thin metal strips is in the range of 0.0016 inch to 0.005 inch, with 0.002 inch being preferred (see column 5, lines 42 to 44). Sheller discloses three different alloys in detail. First, a ferritic steel is disclosed, which contains 5 % aluminum (see column 2, lines 50 to 56). Furthermore, it is disclosed that a nickel based steel contains 4.5 % aluminum (see column 2, lines 63 to 67). The third alloy disclosed is Haynes 230 without any aluminum.

The different types of metal strips made from alloys, which are selected solely depending on their yield and tensile strengths, are to achieve the aim of providing the catalyst carrier bodies reinforced by the metal strips with a higher strength that will survive the hot tests. This means that one skilled in the art would not vary the aluminum content with

respect to the thickness of the foil. Rather, one skilled in the art would search for other alloys having higher tensile or yield strengths if he or she wanted to improve the product as described by Sheller. Furthermore, after carefully studying the Sheller document, one skilled in the art would not see any need to improve the products manufactured according to Sheller, as these are fully advantageous as described in the paragraph at column 6, lines 54 to 65. It is disclosed in that paragraph that the reinforced device according to Sheller will withstand the hot tests and does not have to be brazed or welded, so that considerable expense is spared. Fatigue failure is avoided and the catalytic converter according to Sheller does not show any telescoping. Therefore, having such an advantageous device, one skilled in the art would see no need to improve this device.

Therefore, one skilled in the art would not combine Sheller with Aggen et al. Even if one skilled in the art would combine these two documents, he or she would not reach the teaching of claims 1 and 19 of the instant application.

The subject matter of Aggen et al. is an alloy that is thermal cyclic oxidation resistant and hot workable. Aggen et al. state that the aluminum content of an alloy is a function of the chromium content of the alloy (see column 4, lines 21 to 24). The minimum aluminum content disclosed by Aggen et al.

is 3%, whereas the maximum content of aluminum according to claims 1 and 19 is

12% times 0.02 mm divided by 0.08 mm

resulting in a maximum aluminum content of 3%.

This means that in order to reach the teaching of claims 1 and 19 of the instant application, it would be necessary to lower the aluminum content of the alloy disclosed by Aggen et al. However, Aggen et at. state that "there is a correlation between the increasing aluminum content and the increasing thermal cyclic oxidation resistance of the alloy" (see column 4, lines 8 to 11). Aggen et al. further state that below about 3 % the cyclic oxidation resistance tends to become unacceptably low (see column 4, lines 13 to 15).

Since it would be necessary to lower the aluminum content disclosed by Aggen et al. to reach the teaching of claims 1 and 19 of the instant application, one skilled in the art would be led to the conclusion that this is <u>disadvantageous</u> and would not lead to an alloy having high oxidation resistance.

Consequently, even if one skilled in the art would combine the teachings of Sheller and Aggen et al., he or she would

not reach the teachings of claims 1 and 19 of the instant application. Furthermore, it is extremely doubtful, that one skilled in the art would perform a large number of tests with different alloys, rolling it to different thicknesses to reach the teaching of claim 1 experimentally. This is due to the fact, that on the one hand, such tests are very complicated and expensive and on the other hand, Aggen et al. already disclose a very large number of different alloys in tables I to IV. Therefore, considering such a vast amount of data available, one skilled in the art would not come to the conclusion, that it is advantageous to perform another large number of experiments on the teaching of Aggen et al. and Sheller.

The examiner has stated in the Office Action on page 6, first paragraph that the determination of the optimum or workable ranges of variables might be characterized as routine experimentation. However, Appellant believes that this is not logical due to economic reasons. As stated above, such tests are very expensive and complicated, as well as time consuming. Considering the vast amount of data disclosed by Aggen et al., one skilled in the art would for economic reasons see no reason why he or she should perform another large number of tests to reach the teaching of claims 1 and 19 of the instant application without any motivation.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claims 1 or 19. Claims 1 and 19 are, therefore, believed to be patentable over the art and since claims 4, 6, 10, 13 and 16 are dependent on claim 1, they are believed to be patentable as well. Claims 8-9, 12 and 15 have been cancelled.

In item 4 on pages 4-5 of the above-mentioned Office action, claims 16 and 18 have been rejected as being unpatentable over Sheller in view of Aggen et al. and further in view of Sato et al. (European Publication No. 0 497 992 A1) under 35 U.S.C. § 103(a).

As discussed above, claim 1 is believed to be patentable over the art. Since claims 16 is dependent on claim 1, it is believed to be patentable as well. Claim 18 has been cancelled.

The honorable Board is therefore respectfully urged to reverse the final rejection of the Primary Examiner.

Respectfully submitted,

For Appellant

YHC/bb

LAURENCE A. GREENBERG
REG. NO. 29,308

Date: July 3, 2003

Lerner and Greenberg, P.A.
Post Office Box 2480
Hollywood, Florida 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101

Appendix - Appealed Claims:

1. A honeycomb catalyst carrier body for exhaust gas-cleaning systems of motorcycles, comprising:

layered or wound sheet-metal layers at least partially structured to form passages through which exhaust gas can flow, said sheet-metal layers formed of a stainless steel, having a thickness of more than 0.08 mm and having an aluminum content in percent by weight of between 6 and 12% multiplied by 0.02 mm divided by said thickness of said sheet-metal layers.

4. The honeycomb body according to claim 1, wherein said thickness of said sheet-metal layers is from 0.08 to 0.12 mm.

6. The honeycomb body according to claim 1, wherein said passages number between 200 and 600 cpsi (cells per square inch).

10. The honeycomb body according to claim 1, wherein said aluminum has a content of 2 to 4%.

13. The honeycomb body according to claim 1, wherein said sheet-metal layers are rolled.

16. The honeycomb body according to claim 1, wherein said sheet-metal layers are rolled and removed from a production process for producing hot-dip aluminized material before an aluminum content is raised.

19. A honeycomb body, comprising:

layered or wound sheet-metal layers at least partially structured to form passages through which exhaust gas can flow, said sheet-metal layers formed of a stainless steel, having a thickness of more than 0.08 mm and having an aluminum content in percent by weight of between 6 and 12% multiplied by 0.02 mm divided by said thickness of said sheet-metal layers.